SERVICE MANUAL

for

ARRIFLEX® 16 S

(STANDARD)

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INTRODUCTION

This manual has been prepared to guide the technician in the servicing of the Arriflex-16S (Standard) Camera. It is intended for the technicians qualified by training and experience for work of this kind.

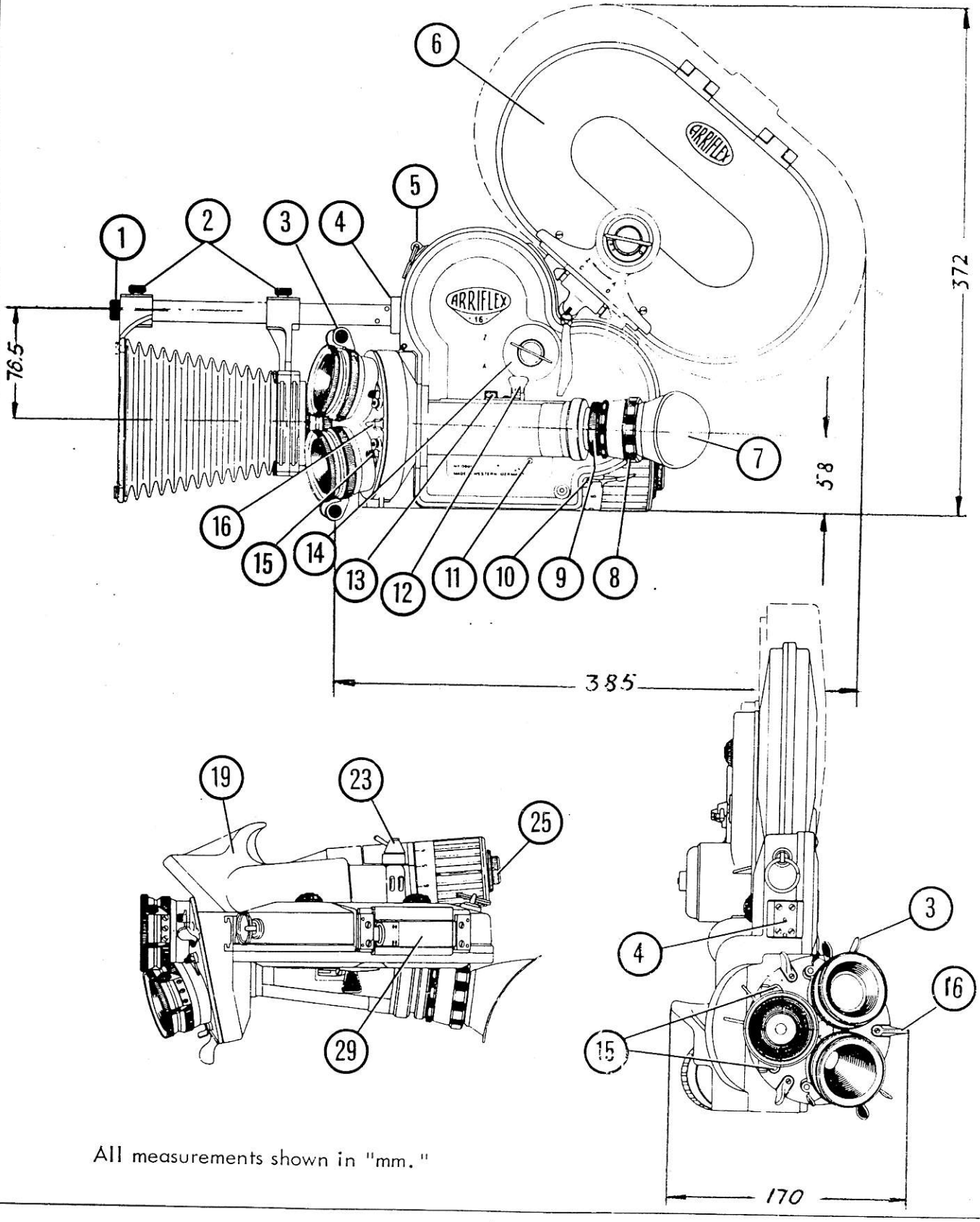
The detailed information contained in this book should result in efficient maintenance and repair comparable to Arriflex standards.

All numbers and names of parts mentioned in this manual correspond with the Arriflex parts catalog. Manual and catalog should, therefore, be kept together for easy reference.

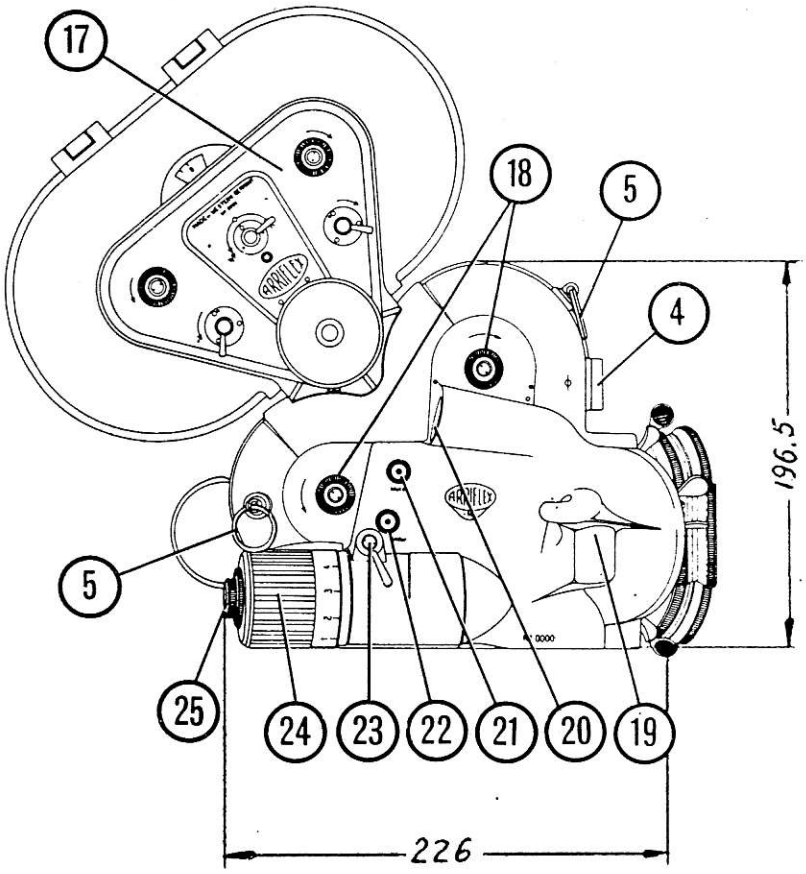
Arriflex Corporation of America maintains a complete stock of parts and a modern, fully equippea service department, manned by factory trained technicians.

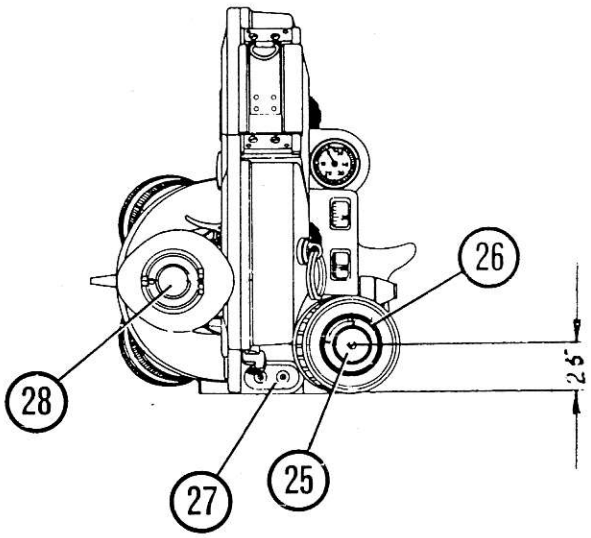
DIAGRAM OF ARRIFLEX 16 S (Standard)

showing external controls and features



All measurements shown in "mm."





1) Lock screw for matte box boom
2) Lock screws for adjusting front and rear matte box standards
3) Follow focus wings on each lens
4) Slide-in shoe for matte box
5) Eyelet for attaching shoulder strap
6) Interchangeable magazine 200 or 400 ft.
7) Finder eyepiece with rubber eyecup
8) Diopter adjustment ring
9) Knurled ring for removing eyepiece
10) Battery cable lock
11) External buckle switch override
12) Locking start/stop switch
13) Lock release for switch
14) Cover lock
15) Lens socket lock levers (1 of 6)
16) Turret grip (1 of 3)
17) Interchangeable torque motor (only one needed for camera)
18) Feed- and take-up spindles
19) Contour grip with thumb rest
20) Tachometer
21) Footage counter setting disk
22) Frame counter setting disk
23) Motor lock
24) Interchangeable motor
25) Knob for manually turning motor
26) Forward and reverse switch for variable speed motor
27) Battery cable socket
28) Light cover in finder eyepiece in closed position
29) Magazine cavity cover

PREVENTIVE MAINTENANCE

Since the failure or inefficient operation of even one component can cause the breakdown of the entire equipment, the importance of preventive maintenance is obvious.

TOOLS AND MATERIAL USED:

Lens tissue
Lens cleaning fluid
Brushes (camel-hair)
Clean, soft cloth
Orange stick
Arri Oiler with special Arri oil
Arri grease

LUBRICATION: After each run of approximately 30,000 ft. of film through the camera, the camera should be lightly oiled at two oil valves marked with arrows (one near the film gate, and one near the spindle.) Only use the ball and pressure oiler supplied with the camera and the special oil contained. Do not over oil - too much oiling is as bad as too little.

CLEANING: The camera must always be kept absolutely clean. To prevent dust from getting into the camera body, the lenses must always be in the turret, or if removed - must be replaced by cavity caps. When there is no magazine on the camera, the dust cover must be put in place instead. By storing the camera in its case and keeping the case closed, the camera will be best protected.

The lens surfaces, the mirror surface, and the rest of the optical system of the camera should never be touched with the fingers. If they require cleaning, camel-hair brush or a well laundered soft piece of linen cloth or lens tissue should be used. Clean gently and with care.

Between magazine changes, the film gate should be opened and examined for emulsion deposits. If emulsion has deposited, use the orange stick to remove it. Never use metal. Also regularly check the side pressure rail for emulsion accumulation, which may prevent its freedom of action.

Film splinters, which might accumulate in the body of the camera, must be removed by means of a camel-hair brush so that they cannot get into the camera mechanism.

From time to time, the lens mounts and the three lens sockets in the turret should be cleaned to remove dirt and dust which will adhere. After such cleaning, re-lubricate lightly with the special grease supplied with the camera.

SPECIAL TOOLS FOR THE ARRIFLEX-16

Special tools and gauges are required for the proper servicing and maintenance of the Arriflex 16. A list of these tools with complete descriptions and photographs is included at the end of this manual. These tools can be obtained in sets from the Arriflex Corporation of America, New York.

TROUBLE SHOOTING CHART AND POSSIBLE CAUSES

1. Picture not sharp
   - a. Improper diopter setting
   - b. Lens out of adjustment
   - c. Incorrect flange focal distance
   - d. Viewfinder tube out of adjustment
   - e. Lens elements not clean or loose
   - f. Play in lens mount
   - g. Inferior optical quality of filter

2. Unsteady picture
   - a. Emulsion build-up or aperture plate or side pressure rail
   - b. Improper threading of upper or lower loop, may be either too short or too long
   - c. Film gate pressure pad may have too much or too little pressure
   - d. Side pressure pad has too much or too little pressure
   - e. Play in film transport mechanism

3. Light-struck film
   - a. Magazine not loaded or unloaded in complete darkness
   - b. Magazine or camera cover not closed properly
   - c. Viewfinder left open with camera running
   - d. Magazine not properly attached to camera
   - e. Camera or magazine not light-tight (missing parts or screw - damaged light traps)
   - f. Light entered through open lens cavity in turret

4. Camera speed not steady

a. Cable does not make proper contact to camera or power supply
b. Foreign matter such as dirt, film chips, etc. in film drive mechanism or motor commutator
c. Discharged or defective battery supply
d. Motor requires servicing
e. Slipping or defective tachometer

5. Film scratched

a. Emulsion build-up in gate
b. Guiding surfaces in film gate damaged

6. Camera does not come up to required speed

a. Low battery power
b. Camera mechanism stiff due to lack of a proper lubrication
c. Low temperatures effecting movement or tachometer
d. Tachometer slipping

7. Magazine does not take-up properly

a. Torque Motor does not make proper contacts to magazine
b. Magazine does not make proper contact to camera
c. Battery voltage under 7 volts
d. Film is dished and touches magazine door or magazine bottom
e. Magazine rollers or torque motor magazine drive gear does not move freely
f. Poor ground connection between camera power cable and torque motor

8. Tachometer does not register speed

a. Tachometer gear might be loose or disengaged from drive gear
b. Tachometer defective

9. Camera does not start

a. Improper connection
b. Defective cable
c. Defective battery or loose battery terminals
d. Switch plunger in camera door does not reach switch contact
e. Buckle switch is not reset or defective
f. Motor is not locked properly to camera housing
g. Motor does not make contact with switch in camera housing

TECHNICAL DATA FOR ARRIFLEX-16

All Arriflex cameras are adjusted exactly for a flange focal distance of 51.98 $^{+0}_{-1}$ mm

All lenses used on Arriflex cameras must be set to exactly 52mm flange focal distance.

Therefore: All lenses can be interchanged in any of the three lens sockets. Lenses also may be interchanged from camera to camera.

Spring tension on film pressure plate --- 90 grams

Spring tension on side pressure rail --- 40 grams

Spring tension on variable speed motor brushes --- 80 grams

POWER REQUIREMENTS:

Voltage for variable speed motor or governor controlled motor --- 8 volt DC

AMPERAGE:

Approximately 3.2 - 3.4 amps with 400 ft. magazine load

Approximately 2.5 amps without 400 ft. magazine (at 24 fps)

RPM: 4320 rpm at 24 fps.

Power requirements of 42 volt synchronous motor - approximately 100 watts 60 cycle AC

Temperature operating range of standard factory lubricant: Approximately + 113° F to - 25° F. For further information concerning special lubricants for winterizing equipment, please contact our service department.

GENERAL CHECK LIST

Before and after camera has been serviced, the following points should be checked as a routine:

1. Check lenses for proper focus on Collimator
2. Check flange focal distance
3. Check viewfinder for proper infinity adjustment
4. Check film pressure plate for proper pressure
5. Check side pressure rail for proper spring tension
6. Check film gate for emulsion deposits
7. Check film gate for scratches
8. Check timing of shutter in relation to claw movement
9. Check registration pin action and film transport movement for proper function
10. Check magazine lock assembly (on camera) for proper fit
11. Check camera motor (and rheostat) and magazine torque motor
12. Check camera for obvious damage or excessively worn parts
13. Check lens turret for proper fit to camera and smooth action
14. Make and check test film for frame line, steadiness, sharpness, scratches
15. Check magazine feed and take-up
16. Check power supply

DISASSEMBLY OF ARRIFLEX-16

This section covers the disassembly of the camera into major groups (sub-assemblies) as would be necessary for general cleaning and inspection of the camera.

After source and extent of trouble has been determined, refer to paragraphs describing further disassembly.

All numbers and names of parts used in this manual correspond to the Arriflex factory parts list numbers.

REMOVAL OF FILM PRESSURE PLATE P/N D-56

The film pressure plate can be simply removed by placing two pieces of film strips underneath the springs on the back-side of the film pressure plate, as shown on fig. 1. Now just slide pressure plate from hinged door, p/n D-54.

REMOVAL OF SWITCH ASSEMBLY C

The switch is mounted to the camera housing by two countersunk screws from the bottom of the camera. Remove screws and gently push out switch from the back until the clamp, p/n C-8, to which wire is connected, is accessible. Disconnect wire from clamp. It is not necessary to remove clamp. See fig. 2

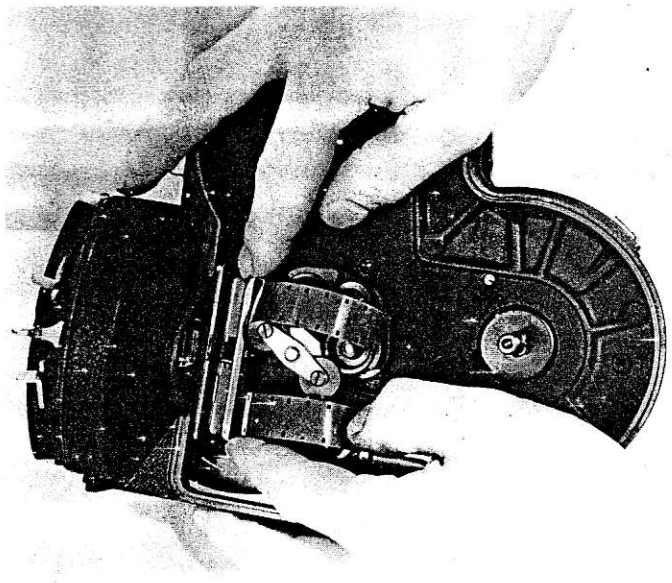


Fig. 1

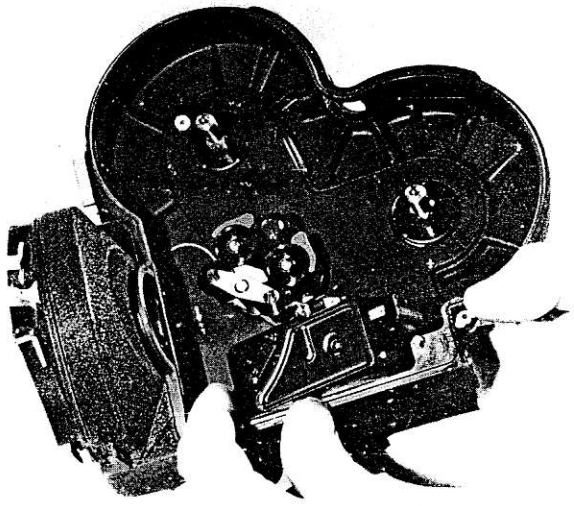


Fig. 2

REMOVAL OF CAMERA MECHANISM ASSEMBLY B

1. Remove drive belt cover plate, p/n A-85 by removing four cheesehead screws as marked "A" on fig. 3.

2. Remove small right angle strip, located next to film-door. Unscrew two small countersunk screws, as marked "B" on fig. 3.

3. Remove take-up and feed spindle assembly. Use tool #K-68 (spanner wrench) and remove screws, p/n A-14, as shown on fig. 4. After disengaging tension belt from its two drive pulleys, both assemblies can be detached from camera housing.

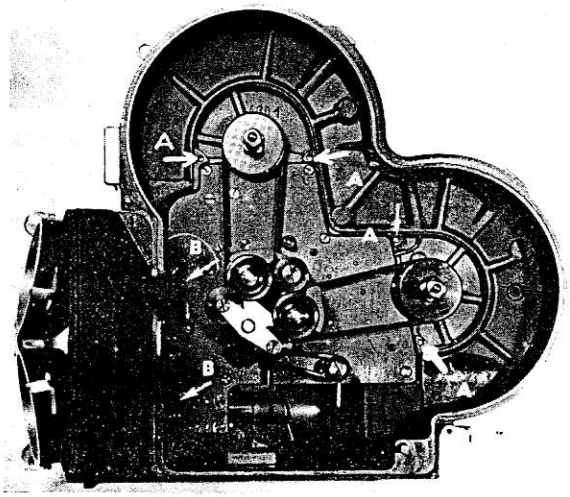


Fig. 3

Fig. 4

4. On cameras with serial #12001 or lower, remove motor drive coupling, p/n B-85. Remove four countersunk screws, p/n B-73, as marked "C" on fig. 5,

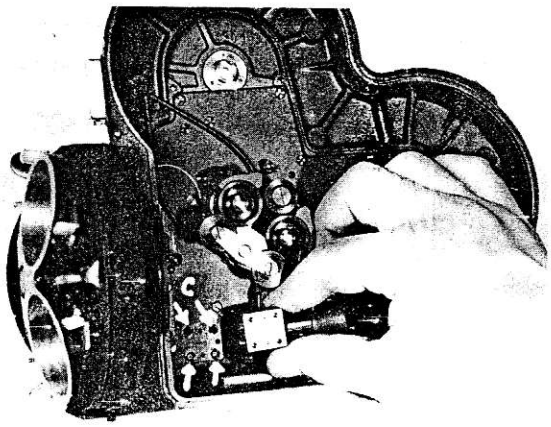


Fig. 5

and disconnect coupling from camera mechanism plate. If motor coupling has tight fit to camera mechanism plate, use small puncher and push or punch out locating pins. Locating pins will remain in the motor drive coupling itself.

Note; Between the drive coupling and the mechanism plate there may sometimes be bronze shims. Be sure to put these shims back in place when re-assembling camera. The purpose of these shims is to maintain exact gear engagement.

On cameras with serial #12001 and higher, the drive coupling is permanently connected to the shutter housing and cannot be removed at this point in disassembly.

5. Removal of light-trap baffle, p/n A-42: This part also has to be removed first before mechanism plate can be detached from camera. The two screws, which hold the light-trap baffle, are covered with velvet. Gently remove glued-on velvet until the two screws are visible for their removal. By a slight twist this light baffle can be released from the camera housing.

6. Now remove all screws which connect the camera mechanism plate to the camera housing, as shown in fig. 6, marked "D" and all the screws which connect mechanism plate to film transport assembly, marked "E" on fig. 6.

Now the mechanism plate can be gently lifted out of place, as shown in fig. 7.

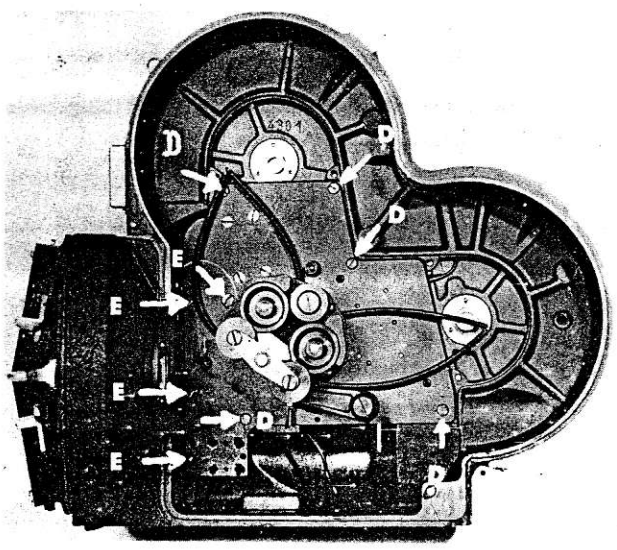


Fig. 6

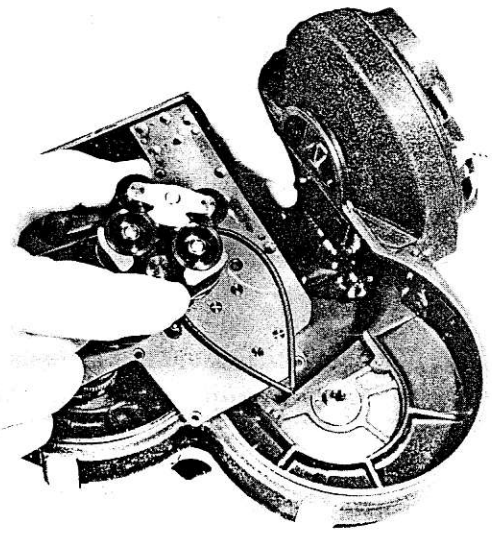


Fig. 7

REMOVAL OF SHUTTER AND TRANSPORT MECHANISM ASSEMBLY D

Through the lens cavities you have access to two cheesehead screws which are the last two points at which the shutter mechanism is being held. Therefore extreme care has to be taken in removing them since the mirror-shutter could be broken or chipped by allowing it to move in the camera housing. The movement must be firmly held in place with your fingers. As shown in fig. 8, shutter mechanism can now be removed. No force should be applied at any time.

Fig. 8

REMOVAL OF PRISM AND FIELD LENS HOUSING

For easier cleaning the prism and field lens housing unit should be detached from the shutter and transport mechanism assembly.

NOTE: On cameras with serial numbers lower than #5578 prism is mounted on camera housing. For cameras from #5579 to #12001, prism and field lens is one casting attached to shutter mechanism. On cameras with serial numbers higher than #12001, round field lens is mounted into side plate of shutter mechanism.

Now that the camera has been disassembled into major groups, you are ready for general inspection, cleaning and lubrication.

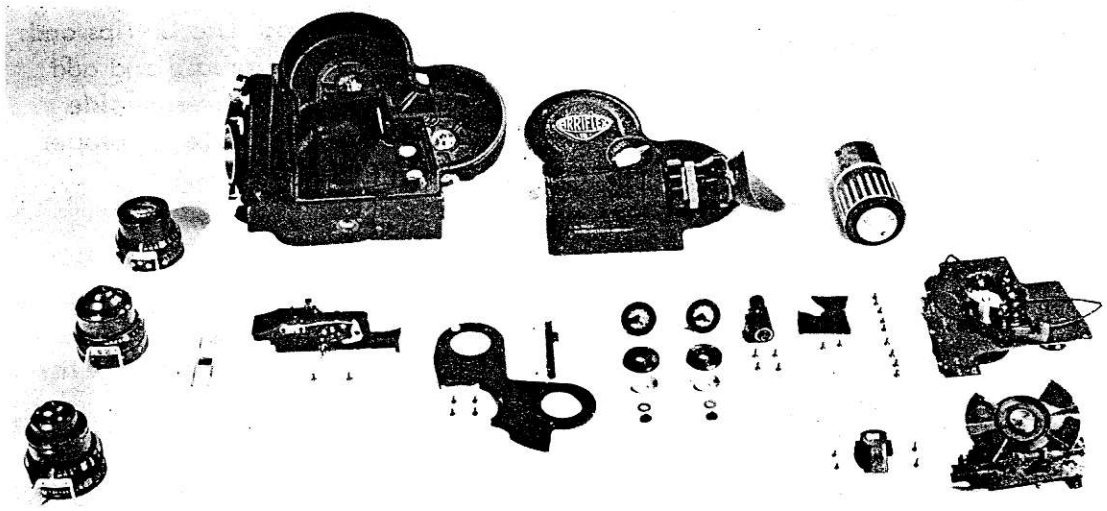


Fig. 9

SHUTTER AND TRANSPORT MECHANISM

The mirror-shutter film movement is made of high precision components, hand selected and specially matched. This fine assembly works with great precision and reliability. Because it is so specialized, field service should be limited to cleaning, lubrication and where necessary, certain limited adjustments. Some suggested services are briefly described in the following pages. All other repairs should be referred to our factory authorized repair centers of the Arriflex Corporation of America in New York and Los Angeles.

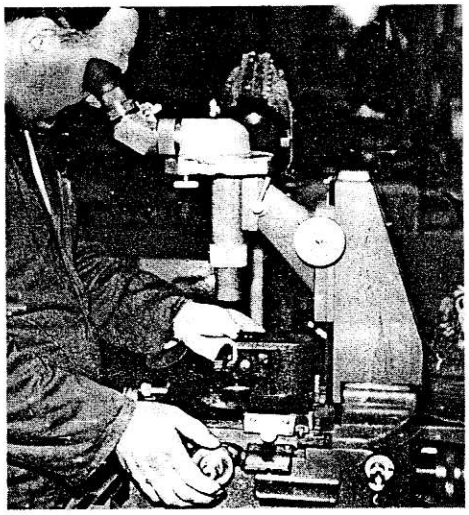


Fig. 10

Figure 10 shows Zeiss microscope measuring device as used at Arriflex factory for measuring and checking of the registration action of the movement.

CLEANING AND LUBRICATION OF MIRROR-SHUTTER AND TRANSPORT MECHANISM P/N D-100

Remove all grease, oil and foreign matter from cams, gears, etc. Use Q-tips and cleaning solvents. Relubricate cams and gears with original Arri grease and add one drop of Arri oil to each moving joint. Clean and inspect film pressure side rail for film emulsion and deposit, etc. Check film side pressure plate for proper function and spring tension, (40 grams.) Check film pressure plate surface (flatness) with straight edge.

Then attach pressure plate to its door and check for proper spring tension, (90 grams.) Turn shaft of cams and check assembly for smooth action of all moving components. If any hard spots are found - the cause might be foreign particles especially in the grooves of transport and registration cams.

Clean all surfaces of prism and field lens and attach to shutter mechanism. For this purpose it is not necessary to remove prism and field lens from its housing. Use only chamois, lens brush and air blower.

After all this has been done the complete assembly should be kept in a clean box until needed for complete reassembly of camera.

Note: Do not remove screws which are sealed with paint.

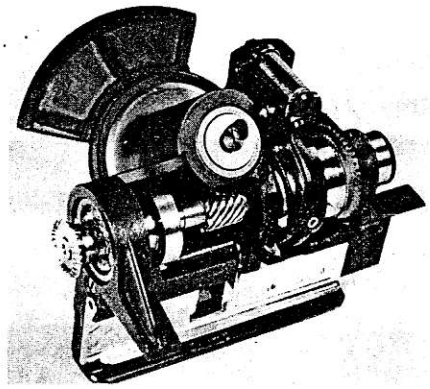


Fig. 11

CHECKING THE MIRROR-SHUTTER AND TRANSPORT MECHANISM P/N D-100

If a camera produces an unsteady picture, if the frame line is off or the film transport does not function properly, check as follows: